

TCC Jim Bolen Math Competition Rules and Facts

Rules:

The Jim Bolen Math Competition is composed of two one hour multiple choice pre-calculus tests. The first test is scheduled on Friday, November 8, 2013 at 2:00 pm in ESEE 2312/ 2314. The second test will be on Friday, February 28, 2014 at 2:00 p.m.

To qualify for the competition: Students do NOT have to be enrolled in math classes. Students must be enrolled for at least 6 semester hours each of the fall or spring semesters. At completion of the fall semester, students must not have earned more than 70 college level hours. Students must not have earned a two year or higher degree or be enrolled at a four year institution. Students may be dual credit students as long as they meet the rest of the requirements. Students may be taking classes at other institutions as long as they take more than half of their credit hours at TCC.

For tests from previous years with answers you can visit the web site of AMATYC (American Mathematical Association of Two Year Colleges): <http://www.amatyc.org/SML/old-competition-questions.htm>.

No calculator with a typewriter-like keyboard - is allowed. Nothing like computers, PDA, books, mathematical tables or anything with a disk drive is allowed. Each question has a 2 point value for a correct answer and a penalty of -1/2 point for each wrong answer. No deduction for unanswered questions.

The TCC - SE Math Club meets and works on solving problems from Math Competition tests from previous years. For more information about their activities and how to participate, please visit the Math Club on Facebook: TCC SE Math Club (see also Tccse Mathclub, and TCC SE Jim Bolen Math Competition Training). It is free to join! For more information about the Math Club you can contact the faculty advisor of the club Nena Kabranski (nena.kabranski@tccd.edu).

The Math Resource Center also offers help with questions about problems from the Math Competition. The best days to visit the Math Resource Center with questions about the competition are Tuesday, Thursday and Saturday. For more information about the Math Resource Center call 817 - 515 - 3806.

Cash Prizes:

The top student on each campus (both rounds combined) receives **\$100.00**.

Top TEN students in the District (both rounds combined) receive cash prizes from **\$100** to **\$1000**.

Scholarships:

Students who perform well on the competition have a chance to interview with local universities and compete for scholarships. The scholarships awarded last year were from

Texas Christian University
Baylor University
Tarrant County College

Tarleton State University
University of Texas at Arlington

The scholarships ranged in value from \$1,000 to over \$70, 000 (two-year full tuition paid scholarship to TCU) and many of them were renewable for up to three years.

Every student who competes (one or both rounds) gets a FREE t-shirt!!!!

For more information contact Carol White in ESED 2404A, /817/ 515 - 3627, carol.white@tccd.edu.

2014 Jim Bolen Mathematics Competition Rules

1. Candidates must be currently enrolled at TCC
2. Candidates must not have achieved a two year degree, a degree that is considered higher than a two year degree or have junior standing (completed 70+ credit hours) upon completion of the fall semester to be eligible to earn prizes
3. Candidates must be enrolled in a minimum of 6 hours at TCC at the time of the exam
4. Candidates may be enrolled in high school and be taking dual credit courses as long as they meet the other requirements set forth
5. Candidates may be enrolled in a four year institution, but cannot be taking more credit hours there than they are currently enrolled in at TCC
6. Students with fewer than 30 credit hours upon completion of the fall semester may be considered for 1st year scholarships to return to TCC
7. Students with 30 or more credit hours upon completion of the fall semester may be considered for transfer scholarships
8. Results of all eligible Jim Bolen Math Competition participants will automatically be submitted to the national competition
(AMATYC, Student Math League - <http://www.amatyc.org/SML/sml-rules.htm>)

1. If the standard order of operations is reversed (that is, additions and subtractions are done first and exponentiation is done last), what is the value of $2 \cdot 3^2 + 3$?
- A. 21 B. 24 C. 39 D. 486 E. 7776
2. The price of a stock rose 20% on Monday, fell 10% on Tuesday, and increased by $1/6$ on Wednesday. By what percent did the price rise from Monday to Wednesday?
- A. 24 B. 26 C. 28 D. 30 E. 32
3. The system of equations $ax - by = 8$ and $ax + by = 20$ has the solution $(x, y) = (2, 3)$. Find $a + b$.
- A. 6 B. 7 C. 8 D. 9 E. 10
4. The positive integers a , b , and c satisfy $a^6 + b^2 + c^2 = 2011$. Find $a + b + c$.
- A. 50 B. 51 C. 52 D. 53 E. 54
5. Different shades of pink, red, and white can be made by mixing whole numbers of quarts of red and white paint. Shades are different if the ratio of red to white paint is different. Find the number of different possible shades that can be made from at most 4 quarts of red and 5 quarts of white paint.
- A. 15 B. 16 C. 17 D. 18 E. 19
6. The function $y = f(x)$ has zeros -2 and 6. Find the zeros of $y = -3f(2 - 2x)$.
- A. 2, -2 B. 5, 1 C. 4, -1 D. -1, -5 E. 1, -3
7. One population $P_1(t)$ grows exponentially at the same rate that another population $P_2(t)$ decays exponentially. If the populations were both equal to P on Jan. 1, 2009, how will the populations be related on Jan. 1, 2012?
- A. $P_1(t)P_2(t) = P$ B. $P_1(t)P_2(t) = P^2$ C. $P_1(t)/P_2(t) = P$ D. $P_1(t) + P_2(t) = P$ E. $P_1(t) + P_2(t) = 2P$
8. For $b > c > 0$, both $x^2 + bx + 8$ and $x^2 + cx + 8$ factor over the integers. Find $b - c$.
- A. 1 B. 2 C. 3 D. 4 E. 5
9. Ed drives from San Mateo to Atascadero, a distance of 197.5 mi. He starts driving at a constant speed and reduces his speed by 5 mph after each half hour of driving. If the trip takes 3 hr 20 min, how far did he travel in the first 2 hours?
- A. 127 B. 132 C. 137 D. 142 E. 147
10. Sun fills her 10 liter radiator with 20% antifreeze and 80% water. She removes some of the mixture and replaces it with antifreeze. If the radiator is now one quarter antifreeze, how many liters of the original mixture did she remove?
- A. 0.25 B. 0.375 C. 0.5 D. 0.625 E. 0.75
11. How many numbers with no more than six digits can be formed using only the digits 1 through 7, with no digit used more than once in a given number?
- A. 879 B. 1956 C. 3619 D. 5040 E. 8659

12. The lines with equations $2x + 3y = 24$ and $3x + 2y = 6$ are symmetric with respect to a line with equation $y = mx + b$ with $m > 0$. Find $m + b$.
- A. 5 B. 12 C. 17 D. 19 E. 20
13. A square of area 45 is inscribed in circle C. Find the area of a square inscribed in a semicircle of circle C. (Inscribed means having all 4 vertices on the given figure).
- A. $5\sqrt{5}$ B. 18 C. $9\sqrt{5}$ D. 20 E. 25
14. The left edge of a dollar bill is folded against the bottom edge to form an isosceles right triangle at the left end. The new left edge is again folded against the bottom edge. A vertex of the new triangle is the upper right corner of the bill. If a dollar bill is 157 mm long, find its width to the nearest millimeter.
- A. 63 B. 64 C. 65 D. 66 E. 67
15. Five boxes are placed inside an empty box. Each of the 5 new boxes is either left empty or has 5 new boxes placed inside it. This process is repeated until there are 18 boxes containing other boxes. Find the number of empty boxes.
- A. 73 B. 75 C. 77 D. 79 E. 81
16. Al, Bo, Cy, and Di are to receive math, physics, chem, and bio awards. Al thinks Di will win bio, Bo thinks Cy will win chem, Cy thinks Al won't win math, and Di thinks Bo will win physics. The math and bio winners are both right, and the other winners are both wrong. Who wins the math award?
- A. Al B. Bo C. Cy D. Di E. not enough information given
17. The digits 1 through 9 are separated into 3 groups of three digits, and the product of each group is found. Let P be the largest of the 3 products. Find the smallest possible value of P.
- A. 70 B. 71 C. 72 D. 73 E. 74
18. Out of 10 red chips and 15 green chips, 6 are placed into a bag, 10 into a box, and 9 into a bowl. In how many ways can the chips be distributed, if only the number of red and green chips in each container matters?
- A. 45 B. 49 C. 50 D. 55 E. 56
19. Square ABCD has side length 72. Let E be the midpoint of side AB, and let \overline{BD} and \overline{CE} intersect at G. Find the length of the altitude to \overline{BE} in $\triangle GEB$.
- A. 12 B. 18 C. 21 D. 24 E. 27
20. Let r be the positive real zero of $P(x) = 9x^5 + 7x^2 - 9$. The sum $r^4 + 2r^9 + \dots + kr^{5k-1} + \dots$ can be represented as the rational number a/b in lowest terms. Find $a + b$.
- A. 110 B. 115 C. 120 D. 125 E. 130

2014 TCC Jim Bolen Math Competition Registration Form

(Please print legibly)

Name	_____	Student ID#	_____
Address	_____	Math Instructor (if known)	_____
	_____	Email	_____
Cell Phone	_____	Home Phone	_____

1. Do you have an associate's degree or higher from any institution? Yes ___ No ___
2. Are you currently enrolled in a 4-year institution? Yes ___ No ___

If yes, how many credit hours are you enrolled in at the four year institution? _____

(To be eligible for prizes and scholarships you may be required to submit an unofficial transcript from all all 4-year institutions you are attending)

How many credit hours are you enrolled in at TCC? _____

3. Estimate the number of credit hours you will have upon completion of the fall semester _____
(To be eligible for prizes and scholarships the students must be below 70 credit hours at the end of the fall semester)

4. Are there guests you would like to invite to the awards ceremony in the spring? Yes ___ No ___
If yes, Name(s) and Addresses:

_____	_____
_____	_____
_____	_____
_____	_____

5. T-shirt size _____

(T-shirts will be distributed during the awards ceremony or can be picked up from the math department after the ceremony in spring)

I give permission to Tarrant County College, the TCC Foundation, and/or campus coordinators to take, distribute and publish my photographs, personal narratives, and all other Bolen Mathematics competition data for news, advertising, donor relations and/or promotional purposes, in print and electronic media. I understand that I will not be compensated for any photograph, narrative or other application data that may be used in this capacity.

Student Signature _____ Date _____